

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

**Application No.:** 10/767,102 **Confirmation No.:** 4434

**Applicants:** Gene A. Golovchenko

**Filed:** January 29, 2004

**TC/A.U.:** 1743

**Examiner:** B. Sines

**Docket No.:** HVD2160

**For:** **Controlled Fabrication of Gaps  
In Electrically Conducting Structures**

**COMMISSIONER FOR PATENTS  
P. O. BOX 1450  
ALEXANDRIA, VIRGINIA 22313-1450**

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*November 14, 2006*  
*[Signature]*

**INFORMATION DISCLOSURE STATEMENT FILED PURSUANT  
TO THE DUTY OF DISCLOSURE UNDER 37 CFR §1.56, §1.97, AND §1.98**

Pursuant to the duty of disclosure under 37 CFR §1.56, §1.97, and §1.98, the  
Applicants request consideration of this Information Disclosure Statement.

**Compliance with 37 CFR §1.97:**

This Information Disclosure Statement is hereby filed under §1.97 (c) at a  
time prior to the mailing date of a final Action or Notice of Allowance.

11/20/2006 HDESTA1 00000024 10767102

03 FC:1806

180.00 OP

A check is enclosed in the amount of \$180.00 to cover the fee under 1.17(p). If any other fees are required, or there are any credits, please apply such to Deposit Account No. 12-1760.

Information Cited:

The Applicants hereby make of record in the instant application the information listed on the attached seven (7) pages of Forms PTO/SB/08A and PTO/SB/08B. The order of presentation of the references on the forms should not be construed as an indication of the importance of the references. A copy of each of the listed items is enclosed.

Remarks:

Items B10, A22, A26, A27, and B6 were cited in the International Search Report for PCT/US2004/002502, which is the international application counterpart to the instant application. WO 00/79257 was also cited in this International Search Report. WO 00/79257 is the international counterpart to U.S. No. 6,627,067, item A30. A copy of the International Search Report for PCT/US2004/002502 accompanies this Information Disclosure Statement.

The instant application is a continuation-in-part of U.S. Nonprovisional Application USSN 10/367,075, filed February 14, 2003. Items A15, A23, and A24 were cited by Examiner Sines in prosecution of USSN 10/367,075.

Application USSN 10/367,075 is in turn a continuation-in-part of U.S. Nonprovisional Application No. 10/186,105, filed June 27, 2002. Item A32 is U.S. No. 6,783,643, the patent that issued from the USSN 10/186,105 application. Items A28, B3, and B4 were cited by the Examiner in prosecution of USSN 10/186,105. Items A9, A22, B4, B9, and B10 were cited in the International Search Report for International Application PCT/US02/20734, which is the international application

counterpart to the USSN 10/186,105 application. A copy of the International Search Report for PCT/US02/20734 accompanies this Information Disclosure Statement.

Application No. 10/186,105 is in turn a continuation-in-part of U.S. Non-provisional Application No. 09/599,137, filed June 22, 2000. Item A28 is U.S. Patent No. 6,464,842, the patent that issued from the 09/599,137 application. Items A8 and A25 were cited by the Examiner in prosecution of USSN 09/599,137. Items A1, A5, A6, A8, A9, A20, A21 were cited in the International Search Report for International Application PCT/US00/17123, which is the international application counterpart to the 09/599,137 parent application. A copy of the International Search Report for PCT/US00/17123 accompanies this Information Disclosure Statement.

The instant application is related to co-pending application USSN 10/695,381, filed October 28, 2003. Item A36 is U.S. application publication No. 2005/0006224 for the USSN 10/695,381 application. Items A22, B10, F1, and U1 were cited in the International Search Report for PCT/US03/34192, which is the international application counterpart to the USSN 10/695,381 application. A copy of the International Search Report for PCT/US03/34192 accompanies this Information Disclosure Statement.

The instant application is also related to co-pending application USSN 10/960,176, filed October 7, 2004. Item A34 is U.S. Application Publication No. 2005/0126905 for the USSN 10/960,176 application. Items B10 and A4 were cited in the International Search Report for PCT/US2004/033086, which is the international application counterpart to the USSN 10/960,176 application. Also cited was WO 03/003446, which is the international application publication corresponding to USSN 10/186,105, issued as U.S. No. 6,783,643, provided as item A32. A copy of the

International Search Report for PCT/US2004/033086 accompanies this Information Disclosure Statement.

The instant application is also related to co-pending application USSN 11/015,349, filed December 17, 2004. Item A35 is U.S. Application Publication No. 2005/0241933 for the USSN 11/015,349 application. Items A30, A37, V1, and W1 were cited in the International Search Report for PCT/US2004/042896, which is the international application counterpart to USSN 11/015,349. A copy of the International Search Report for PCT/US2004/042896 accompanies this Information Disclosure Statement.

Item A21 is a non-English language document, specifically, in German, with no translation provided. In accordance with MPEP 609 A(3), pp. 600-101, Paragraph 2, the requirement for a concise explanation of the relevance of the non-English language Item A21 document is satisfied by the submission herewith of the corresponding International Search Report in which the item was cited, the International Search Report indicating the degree of relevance of the document. On page 1 of the Search Report for International Application No. PCT/US00/17123, Item A21 is referenced and is indicated, by an "A" designation, as "defining the general state of the art which is not considered to be of particular relevance."

The Applicants respectfully request that:

1. The Examiner consider completely the cited information in reaching a determination concerning the patentability of the pending claims;
2. The enclosed seven (7) pages of Forms PTO/SB/08A and PTO/SB/08B be initialed and signed by the Examiner and a signed copy returned to the undersigned Agent to evidence that the cited information has been fully considered by the Patent and Trademark Office during the examination of this application; and

3. The citations for the information listed on the enclosed seven (7) pages of Forms PTO/SB/08A and PTO/SB/08B 1449 be printed on any patent which issues from this application.

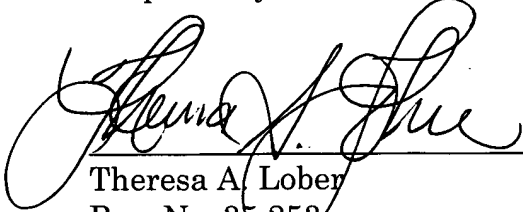
In submitting this Information Disclosure Statement, the Applicants make no representation that a search has been performed, of the extent of any search performed, or that more relevant information does not exist. In submitting this Information Disclosure Statement, the Applicants make no representation that the information cited in the Statement is, or is considered to be, material to patentability as defined in 37 CFR §1.56(b). In submitting this Information Disclosure Statement, the Applicants make no representation that the information cited in the Statement is, or is considered to be, in fact, prior art as defined by 35 U.S.C. §102.

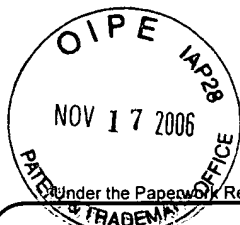
Notwithstanding any statements by the Applicants, the Examiner is urged to form his own conclusion regarding the relevance of the cited information. An early and favorable action is hereby requested.

Respectfully Submitted,

Date:

*November 14, 2006*  
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Concord, Massachusetts 01742  
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PTO/SB/08A (07-05)

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

**Complete if Known**

Application Number	10/767,102
Filing Date	January 29, 2004
First Named Inventor	Jene A. Golovchenko
Art Unit	1743
Examiner Name	B. Sines
Attorney Docket Number	HVD2160

Sheet 1 of 7

**U. S. PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code <sup>2</sup> (if known)			
	A1	US- 4,455,192	06-19-1984	Tamai	
	A2	US- 4,728,591	03-01-1988	Clark et al.	
	A3	US- 4,855,197	08-08-1989	Zapka et al.	
	A4	US- 5,091,320	02-25-1992	Aspnes et al.	
	A5	US- 5,244,527	09-14-1993	Aoyagi	
	A6	US- 5,319,197	06-07-1994	Friedhelm	
	A7	US- 5,420,067	05-30-1995	Hsu	
	A8	US- 5,486,264	01-23-1996	Ghandour	
	A9	US- 5,556,462	09-17-1996	Celii et al.	
	A10	US- 5,753,014	05-19-1998	Van Rijn	
	A11	US- 5,780,852	07-14-1998	Shu	
	A12	US- 5,789,024	08-04-1998	Levy et al.	
	A13	US- 5,851,842	12-22-1998	Katsumata et al.	
	A14	US- 5,798,042	08-25-1998	Chu et al.	
	A15	US- 5,838,005	11-17-1998	Majumdar et al.	
	A16	US- 5,868,947	02-09-1999	Sakaguchi et al.	
	A17	US- 5,876,880	03-02-1999	Vonach et al.	
	A18	US- 5,893,974	04-13-1999	Keller et al.	
	A19	US- 5,962,081	10-05-1999	Ohman et al.	

**FOREIGN PATENT DOCUMENTS**

Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T <sup>6</sup>
		Country Code <sup>3</sup> Number <sup>4</sup> Kind Code <sup>5</sup> (if known)				
	A20	EP-0 632 494 A	01-04-1995	Mitsubishi Electric Corp.		
	A21	DE-44 33 845-A	03-28-1996	Fraunhofer Ges Forschung		
	A22	WO-00 78668-A	12-28-2000	Pres & Fellows Harvard Coll.		

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This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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**INFORMATION DISCLOSURE  
STATEMENT BY APPLICANT**

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Sheet 2 of 7**Complete if Known**

Application Number	10/767,102
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First Named Inventor	Jene A. Golovchenko
Art Unit	1743
Examiner Name	B. Sines
Attorney Docket Number	HVD2160

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	A23	US- 5,969,345	10-19-1999	Williams et al.	
	A24	US- 6,080,586	06-27-2000	Baldeschieler et al.	
	A25	US- 6,106,677	08-22-2000	Sandhu	
	A26	US- 6,383,826	05-07-2002	Barsky et al.	
	A27	US- 6,426,296	07-30-2002	Okojie	
	A28	US- 6,464,842	10-15-2002	Golovchenko et al.	
	A29	US- 2003/0058799	03-27-2003	Yamakawa et al.	
	A30	US- 6,627,067	09-30-2003	Branton et al.	
	A31	US- 2003/0187237	10-02-2003	Chan et al.	
	A32	US- 6,783,643	08-31-2004	Golovchenko et al.	
	A33	US- 2004/0229386	11-18-2004	Golovchenko et al.	
	A34	US- 2005/0126905	06-16-2005	Golovchenko et al.	
	A35	US- 2005/0241933	11-03-2005	Branton et al.	
	A36	US- 2005/0006224	01-13-2005	Golovchenko et al.	
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		Country Code <sup>3</sup> -Number <sup>4</sup> -Kind Code <sup>5</sup> (if known)				
	A37	WO 2004/078640-A1	09-16-2004	Technische Universiteit Delft		

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				Filing Date	January 29, 2004
				First Named Inventor	Jene A. Golovchenko
				Art Unit	1743
				Examiner Name	B. Sines
Sheet 3 of 7	Attorney Docket Number HVD2160				

NON PATENT LITERATURE DOCUMENTS			
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	B1	YOLDAS et al., "Formation of Broad Band Antireflective Coatings on Fused Silica for High Power Laser Applications," Thin Solid Films, Vol. 129, pp. 1-14, 1985.	
	B2	SHANK et al., "Fabrication of high aspect ratio structures for microchannel plates," J. Vac. Sci. Technol. B. Vol. 13, No. 6, pp. 2736-2740, Nov/Dec 1995.	
	B3	GRIBOV, et al., "A new fabrication process for metallic point contacts," Microelectronic Engineering, Vol. 35, pp. 317-320, 1997.	
	B4	ERLEBACHER et al., "Spontaneous Pattern Formation on Ion Bombarded Si(001), Phys. Rev. Letts., Vol. 82, No. 11, pp. 2330-2332, March 1999.	
	B5	DESHMUKH et al., "Nanofabrication using a stencil mask," Appl. Phys. Letts. Vol. 75, No. 11, pp. 1631-1633, September 1999.	
	B6	WALKER et al., "Focused ion beam processing for microscale fabrication," Microelectronic Engineering, Vol. 30, pp. 517-522, 1996.	
	B7	WELLOCK et al., "Giant magnetoresistance of magnetic multilayer point contacts," Phys. Rev. B, Vol. 60, No. 14, pp. 10291-10301, October 1999-II.	
	B8	DESAI et al., "Characterization of micromachined silicon membranes for immunosilation and biseparation applications," Jnl of Membrane Science, Vol. 159, pp.221-231, 1999.	
	B9	ERLEBACHER et al., "Nonlinear amplitude evolution during spontaneous patterning of ion-bombarded Si(001)," J. Vac. Sci. Technol. A., Vol. 18, No. 1, pp. 115-120, Jan/Feb 2000.	
	B10	LI et al., "Ion-beam sculpting at nanometre length scales," Nature, Vol. 412, pp. 166-169, July 2001.	

Examiner Signature		Date Considered	
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup> Applicant's unique citation designation number (optional). <sup>2</sup> Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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				Art Unit	1743
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Sheet	4	of	7	Attorney Docket Number	HVD2160

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	NN	KENNY et al., "Micromachined silicon tunnel sensor for motion detection," Appl. Phys. Lett., Vol. 58, No. 1, pp. 100-102, January 7, 1991.	
	OO	CHEN et al., "Novel fabrication method for nanometer-scale silicon dots and wires," Appl. Phys. Lett., Vol. 62, No. 16, pp. 1949-1951, April 1993.	
	PP	ROCKSTAD et al., "A miniature high-sensitivity broad-band accelerometer based on electron tunneling transducers," Sensors and Actuators A, Vol. 43, pp. 107-114, 1994.	
	QQ	LUTWYCHE et al., "Observation of a vacuum tunnel gap in a transmission electron microscope using a micromechanical tunneling microscope," Appl. Phys. Lett., Vol. 66, No. 21, pp. 2807-2809, May 1995.	
	RR	RALPH et al., "Spectroscopic Measurements of Discrete Electronic States in Single Metal Particles," Phys. Rev. Lett., Vol. 74, No. 16, pp. 3241-3244, April 1995.	
	SS	CHEN et al., "Coulomb blockade at 77 K in nanoscale metallic islands in a lateral nanostructure," Appl. Phys. Lett., Vol. 66, No. 24, pp. 3383-3384, June 1995.	
	TT	ZHOU et al., "Microfabrication of a mechanically controllable break junction in silicon," Appl. Phys. Lett., Vol. 67, No. 8, pp. 1160-1161, August 1995.	
	UU	LUTWYCHE et al., "Direct observation of a vacuum tunnel gap in a tunneling microscope using a transmission electron microscope," J. Vac. Sci. Technol. B, Vol. 13, No. 6, pp. 2819-2822, Nov 1995.	
	VV	KUBATKIN et al., "Single-electron transistor of a single organic molecule with access to several redox states," Nature, Vol. 425, pp. 698-701, October 16, 2003.	
	WW	KLEIN et al., "An approach to electrical studies of single nanocrystals," Appl. Phys. Lett., Vol. 68, No. 18, pp. 2574-2576, April 1996.	

Examiner Signature	Date Considered
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Sheet 5 of 7	Attorney Docket Number HVD2160				

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	XX	SATO et al., "Observation of a Coulomb staircase in electron transport through a molecularly linked chain of gold colloidal particles," Appl. Phys. Lett., Vol. 70, No. 20, pp. 2759-2761, May 1997.	
	YY	RALPH et al., "Gate-Voltage Studies of Discrete Electronic States in Aluminum Nanoparticles," Phys. Rev. Lett., Vol. 78, No. 21, pp. 4087-4090, May 1997.	
	ZZ	BEZRYADIN et al., "Nanofabrication of electrodes with sub-5 nm spacing for transport experiments on single molecules and metal clusters," J. Vac., Sci. Technol. B Vol. 15, No. 4, pp. 793-799, July 1997.	
	Z1	BEZRYADIN et al., "Electrostatic trapping of single conducting nanoparticles between nanoelectrodes," Appl. Phys. Lett., Vol. 71, No. 9, pp. 1273-1275, September 1997.	
	Y1	DATTA et al., "Current-Voltage Characteristics of Self-Assembled Monolayers by Scanning Tunneling Microscopy," Phys. Rev. Lett., Vol. 79, No. 13, pp. 2530-2533, Sept. 1997.	
	C1	REED et al., "Conductance of a Molecular Junction," Science, Vol. 278, pp. 252-254, October 1997.	
	D1	KLEIN et al., "A single-electron transistor made from a cadmium selenide nanocrystal," Nature, Vol. 389, pp. 99-701, October 1997.	
	E1	KOMURO et al., "Lateral tunnel junction produced by electron-beam-induced deposition," J. Vac. Sci. Technol. B, Vol. 15, No. 6, pp. 2809-2815, November 1997.	
	F1	GOSCHNICK et al., "Non-uniform SiO <sub>2</sub> membranes produced by ion beam-assisted chemical vapor deposition to tune WO <sub>3</sub> gas sensor microarrays," Surf. and Coat. Technol., Vol. 108-109, pp. 292-296, 1998.	
	G1	DESMICHT et al., "Point-contact electrodes to probe charging effects in individual ultrasmall cobalt clusters," Appl. Phys. Lett., Vol. 72, No. 3, pp. 386-388, January 1998.	

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				<b>Application Number</b>	10/767,102
				<b>Filing Date</b>	January 29, 2004
				<b>First Named Inventor</b>	Gene A. Golovchenko
				<b>Art Unit</b>	1743
				<b>Examiner Name</b>	B. Sines
Sheet	6	of	7	<b>Attorney Docket Number</b>	HVD2160

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T <sup>2</sup>
	H1	JUNNO et al., "Fabrication of quantum devices by Angstrom-level manipulation of nanoparticles with an atomic force microscope," Appl. Phys. Lett., Vol. 72, No. 5, pp. 548-550, February 1998.	
	I1	DAVIDOVIC et al., "Coulomb blockade and discrete energy levels in Au nanoparticles," Appl. Phys., Lett., Vol. 73, No. 26, pp. 3959-3961, December 1998.	
	J1	MORPURGO et al., "Controlled fabrication of metallic electrodes with atomic separation," Appl. Phys. Lett., Vol. 74, No. 14, pp. 2084-2086, April 1999.	
	K1	BRANTON et al., "Adapting to nanoscale events," Nature, Vol. 398, pp.60-661, April 1999.	
	L1	KERGUERIS et al., "Electron transport through a metal-molecule-metal junction," Phys. Rev. B, Vol. 59, No. 19, PRB 59, pp. 12 505- 12 513, May 1999.	
	M1	PARK et al., "Fabrication of metallic electrodes with nanometer separation by electromigration," Appl. Phys. Lett., Vol. 75, No. 2, pp. 301-303, July 1999.	
	N1	PORATH et al., "Direct measurement of electrical transport through DNA molecules," Nature, Vol. 403, pp. 635-638, February 2000.	
	O1	KUBATKIN et al., "Tunneling Through a Single Quench-condensed Cluster," Jnl. Low Temp. Phys., Vol. 118, Nos. 5/6, pp. 307-316, 2000.	
	P1	WANG et al., "Nanopores with a spark for single-molecule detection," Nature Biotechnology, Vol. 19, pp. 622-623, July 2001.	
	Q1	HERMANSON et al., "Dielectrophoretic Assembly of Electrically Functional Microwires from Nanoparticle Suspensions," Science, Vol. 294, pp.082-1085, November 2001.	

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	R1	YOO et al., "Electrical Conduction through Poly(dA)-Poly(dG)-Poly(dC) DNA Molecules," Phys. Rev. Lett., Vol. 87, No. 19, pp. 198102-1198102-4, November 2001.	
	S1	LIANG et al., "Kondo resonance in a single-molecule transistor," Nature, Vol. 417, pp.725-729, June 2002.	
	T1	PARK et al., "Coulomb blockade and the Kondo effect in single-atom transistors," Nature, Vol. 417, pp. 722-725, June 2002.	
	U1	STEIN et al., "Ion-Beam Sculpting Time Scales," Phys. Rev. Lett., Vol. 89, No. 27, pp. 276106-1 - 276106-4, December 2002.	
	V1	GORDON et al., "A Kinetic Model for Step Coverage by Atomic Layer Deposition in Narrow Holes or Trenches," Chemical Vapor Deposition, Vol. 9, No. 2, pp. 73-78, 2003.	
	W1	LI et al., "DNA molecules and configuration in a solid-state nanopore microscope," Nature Materials, Vol. 2, pp. 611-614, September 2003.	

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